

TRANSLATION

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference B03/0781PC	FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. PCT/EP2004/014495	International filing date (<i>day/month/year</i>) 20.12.2004	Priority date (<i>day/month/year</i>) 22.12.2003
International Patent Classification (IPC) or national classification and IPC C07C209/48 C07C211/12 C07C255/24		
Applicant BASF AKTIENGESELLSCHAFT		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of <u>4</u> sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising: a. <input checked="" type="checkbox"/> (sent to the applicant and to the International Bureau) a total of <u>2</u> sheets, as follows: <input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). <input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items: <input checked="" type="checkbox"/> Box No. I Basis of the report <input type="checkbox"/> Box No. II Priority <input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability <input type="checkbox"/> Box No. IV Lack of unity of invention <input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement <input type="checkbox"/> Box No. VI Certain documents cited <input type="checkbox"/> Box No. VII Certain defects in the international application <input type="checkbox"/> Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

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Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language _____, which is the language of a translation furnished for the purposes of:
- ☐ international search (Rule 12.3 and 23.1(b))
- ☐ publication of the international application (Rule 12.4)
- ☐ international preliminary examination (Rule 55.2 and/or 55.3)
2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1-26 as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☒ the claims:
- nos. _____ as originally filed/furnished
- nos.* _____ as amended (together with any statement) under Article 19
- nos.* 1-9 received by this Authority on 18.04.2006 with telefax
- nos.* _____ received by this Authority on _____
- ☐ the drawings:
- sheets _____ as originally filed/furnished
- sheets* _____ received by this Authority on _____
- sheets* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages _____
- ☐ the claims, nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages _____
- ☐ the claims, nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

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Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement		
1. Statement			
Novelty (N)	Claims	<u>1-9</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-9</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-9</u>	YES
	Claims		NO
2. Citations and explanations (Rule 70.7)			
<p>This report makes reference to the following documents:</p> <p>D1: WO 02/096862 A (E. I. DU PONT DE NEMOURS AND COMPANY) 5 December 2002 (2002-12-05)</p> <p>D2: US 3 919 271 A (PARSHALL ET AL) 11 November 1975 (1975-11-11)</p> <p>D3: WILLIAM T. MILLER ET.AL: "SUBSTITUTION AND ADDITION REACTIONS OF THE FLUOROOLEFINS. IV. REACTIONS OF FLUORIDE ION WITH FLUOROOLEFINS" J. AM. CHEM. SOC, vol. 82, 1960, pages 3091-3099</p> <p>The present application relates to a method of hydrogenating nitrile functions contained in organic compounds on at least one heterogeneous catalyst, characterized in that hydrogenation is carried out in the presence of an ionic liquid, and in that the anion of the ionic liquid is selected from the group consisting of F⁻, Cl⁻, Br⁻, I⁻, acetate, trifluoroacetate, triflate, sulfate, hydrogen sulfate, methyl sulfate, ethyl sulfate, sulfite, hydrogen sulfite, AlCl₄⁻, Al₂Cl₇⁻, Al₃Cl₁₀⁻, AlBr₄⁻, nitrite, nitrate, CuCl₂⁻, phosphates, PO₃⁻, monohydrogen phosphate, dihydrogen phosphate, carbonate, hydrogen</p>			

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Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
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carbonate, sulfonate, tosylate and bis(trifluomethylsulfonyl)imide and the ionic liquid contains phosphonium ions and/or at least one five- or six-membered heterocycle that has at least one phosphorus or nitrogen atom and optionally a sulfur and/or oxygen atom.

D1 (see the passage cited in the ISR, in particular, example 3) is the closest prior art and discloses the heterogeneous hydrogenation of adipodinitrile to produce hexamethylenediamine on Raney nickel in the presence of tetraethylammonium fluoride hydrate (Fp. < 100°C) at a temperature of 75°C and 34 bar. Thus D1 differs from the subject matter of claim 1 in that the feature "ionic liquid contains phosphonium ions and/or at least one five- or six-membered heterocycle that contains at least one phosphorous or nitrogen atom and optionally a sulfur and/or oxygen atom" is not disclosed.

A technical problem is regarded as that of providing an additional method for hydrogenating nitrile functions contained in organic compounds.

The solution is described in the independent claims and relates to the particular cationic portion of the ionic liquid which contains phosphonium ions and/or at least one five- or six-membered heterocycle that has at least one phosphorous or nitrogen atom and optionally a sulfur and/or oxygen atom. This feature, in combination with the hydrogenation of nitrile functions contained in organic compounds, is not obvious to a person skilled in the art from the closest prior art in D1.